WHAT IS CLAIMED IS:

1. An apparatus for processing a surface of a substrate, comprising:

a chamber that contains a gas atmosphere, the chamber including an inner wall;

a substrate holder within the chamber that holds the substrate;

a plasma source that generates a plasma by supplying first electromagnetic waves with a first electric power to the gas atmosphere;

a bias source that generates a bias voltage by supplying second electromagnetic waves with a second electric power to the substrate holder, charged species in the plasma being accelerated by the bias voltage and directed toward the surface of the substrate so that the surface is processed by the accelerated charged species; and

a controller that produces a control signal by monitoring the bias voltage and a ground current that flows from the plasma to the inner wall of the chamber, the control signal being used to control the first electric power.

2. The apparatus according to claim 1, wherein the inner wall is a ground electrode electrically isolated from a remaining portion of the chamber.

3. The apparatus according to claim 2, wherein the ground electrode is replaceable.

4. The apparatus according to claim 1, wherein the controller controls the first electric power and the second electric power using the control signal.

5. An apparatus for processing a surface of a substrate, comprising:

a chamber that contains a gas atmosphere, the chamber including an inner wall;

a substrate holder within the chamber that holds the substrate;

a plasma source that generates a plasma by supplying first electromagnetic waves with a first electric power to the gas atmosphere;

a bias source that generates a bias voltage by supplying second electromagnetic waves with a second electric power to the substrate holder, charged species in the plasma being accelerated by the bias voltage and directed toward the surface of the substrate so that the surface is processed by the accelerated charged species; and

a controller that controls the first electric power such that the bias voltage is maintained within a selected range by increasing the first electric power

when the bias voltage is higher than a selected upper limit and decreasing the first electric power when the bias voltage is lower than a selected lower limit.

6. An apparatus for processing a surface of a substrate, comprising:

a chamber that contains a gas atmosphere, the chamber including an inner wall;

a substrate holder within the chamber that holds the substrate;

a plasma source that generates a plasma by supplying first electromagnetic waves with a first electric power to the gas atmosphere, the inner wall being situated such that reaction products deposit on the inner wall, the reaction products deposited on the inner wall having an influence on the plasma;

a bias source that generates a bias voltage by supplying second electromagnetic waves with a second electric power to the substrate holder, charged species in the plasma being accelerated by the bias voltage and directed toward the surface of the substrate so that the surface is processed by the accelerated charged species; and

a controller that controls the first electric power to compensate the influence of the reaction products deposited on the inner wall, wherein:

the controller monitors an amount of the reaction products deposited on the inner wall by monitoring the bias voltage; and

the controller decreases the first electric power when an increase in the amount of the reaction products is monitored and increases the first electric power when a decrease in the amount of the reaction products is monitored.

7. The apparatus according to claim 6, wherein the controller monitors the amount of the reaction products by monitoring the bias voltage and a ground current that flows from the plasma to the inner wall.

8. The apparatus according to claim 7, wherein the inner wall is a ground electrode electrically isolated from a remaining portion of the chamber.

9. An apparatus for processing a surface of a substrate, comprising:

means for holding the substrate on a substrate holder in a chamber, the chamber including an inner wall;

means for generating a plasma by supplying first electromagnetic waves with a first electric power to a gas atmosphere within the chamber;

means for applying a bias voltage to the substrate by supplying second electromagnetic waves with a second electric power to the substrate holder so that the

surface of the substrate is processes by charged species in the plasma accelerated by the bias voltage;

means for monitoring the bias voltage and a ground current that flows from the plasma to the inner wall of the chamber to produce a control signal; and

means for controlling the first electric power using the control signal.

10. A method for processing a surface of a substrate, comprising:

holding the substrate on a substrate holder in a chamber, the chamber including an inner wall;

generating a plasma by supplying first electromagnetic waves with a first electric power to a gas atmosphere within the chamber;

applying a bias voltage to the substrate by supplying second electromagnetic waves with a second electric power to the substrate holder so that the surface of the substrate is processed by charged species in the plasma accelerated by the bias voltage;

monitoring the bias voltage and a ground current that flows from the plasma to the inner wall of the chamber to produce a control signal; and

controlling the first electric power using the control signal.

11. The method according to claim 10, wherein the controlling comprises controlling the first electric power and the second electric power using the control signal.

12. The method according to claim 10, wherein the inner wall is a ground electrode electrically isolated from a remaining portion of the chamber.

13. A method for processing a surface of a substrate, comprising:

holding the substrate on a substrate holder in a chamber, the chamber including an inner wall;

generating a plasma by supplying first electromagnetic waves with a first electric power to a gas atmosphere within the chamber;

applying a bias voltage to the substrate by supplying second electromagnetic waves with a second electric power to the substrate holder so that the surface of the substrate is processed by charged species in the plasma accelerated by the bias voltage;

controlling the first electric power, including increasing the first electric power when the bias voltage is higher than a selected upper limit, and

decreasing the first electric power when the bias voltage is lower than a selected lower limit.

14. A method for processing a surface of a substrate, comprising:

holding the substrate on a substrate holder in a chamber, the chamber including an inner wall;

generating a plasma by supplying first electromagnetic waves with a first electric power to a gas atmosphere within the chamber;

applying a bias voltage to the substrate by supplying second electromagnetic waves with a second electric power to the substrate holder so that the surface of the substrate is processed by charged species in the plasma accelerated by the bias voltage;

controlling the first electric power to maintain the bias voltage within a selected range; and

when the bias voltage is not maintained within the selected range, controlling the second electric power to maintain the bias voltage within the selected range.

15. A method for processing a surface of a substrate, comprising:

holding the substrate on a substrate holder in a chamber, the chamber having an inner wall;

generating a plasma by supplying first electromagnetic waves with a first electric power to a gas atmosphere within the chamber;

applying a bias voltage to the substrate by supplying second electromagnetic waves with a second electric power to the substrate holder so that the surface of the substrate is processed by charged species in the plasma accelerated by the bias voltage;

controlling the first electric power and the second electric power, including:

a) monitoring the bias voltage and a ground current that flows from the plasma to the inner wall; and

b) when the bias voltage is outside of a first selected range and the ground current is outside of a second selected range, changing the first electric power.

16. The method according to claim 15, wherein the controlling further comprises changing the second electric power when the bias voltage is outside of the first selected range and the ground current is within the second selected range.

17. The method according to claim 15, wherein the inner wall of the chamber is a ground electrode electrically isolated from a remaining portion of the chamber.

18. A method for successively processing a plurality of substrates in a chamber, comprising:

holding one of the plurality of the substrates on a substrate holder within the chamber, the chamber including an inner wall;

generating a plasma by supplying first electromagnetic waves with a first electric power to a gas atmosphere within the chamber;

applying a bias voltage to the substrate by supplying second electromagnetic waves with a second electric power to the substrate holder so that the surface of the substrate is processed by charged species in the plasma accelerated by the bias voltage;

depositing reaction products on the inner wall of the chamber, the reaction products deposited on the inner wall having an influence on the plasma;

monitoring an amount of the reaction products deposited on the inner wall by monitoring the bias voltage; and

controlling the first electric power to compensate the influence of the reaction products, including decreasing the first electric power when an increase in the amount of the reaction products is monitored, and increasing the first electric power when a decrease in the amount of the reaction products is monitored.

19. The method according to claim 18, wherein the monitoring monitors the amount of the reaction products by monitoring the bias voltage and a ground current that flows from the plasma to the inner wall.

20. The method according to claim 19, wherein the inner wall of the chamber is a ground electrode electrically isolated from a remaining portion of the chamber.

21. A method of monitoring deposition of reaction products on an inner wall of a chamber, comprising:

generating a plasma by supplying first electromagnetic waves with a first electric power to a gas atmosphere within the chamber, the chamber including an inner wall;

depositing reaction products on the inner wall of the chamber; and

measuring a ground current that flows from the plasma to the inner wall of the chamber on which the reaction products are deposited.

22. The method according to claim 21, wherein the inner wall of the chamber is a ground electrode electrically isolated from a remaining portion of the chamber.